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No. II.

BULLETIN
OF THE
CHICAGO ACADEMY OF SCIENCES.

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IN
PEORIA LAKE, ILLINOIS.

BY REV. JOSEPH D. WILSON.

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All running water wears away the land over which it flows; that is, it removes particles of soil, sand, etc., to lower levels. It does this in three ways:

FIRST. By taking into itself soluble matter and depositing it by evaporation.

SECOND. By holding in suspension particles of small specific gravity while itself in a state of agitation, and laying them down when it comes to a state of rest.

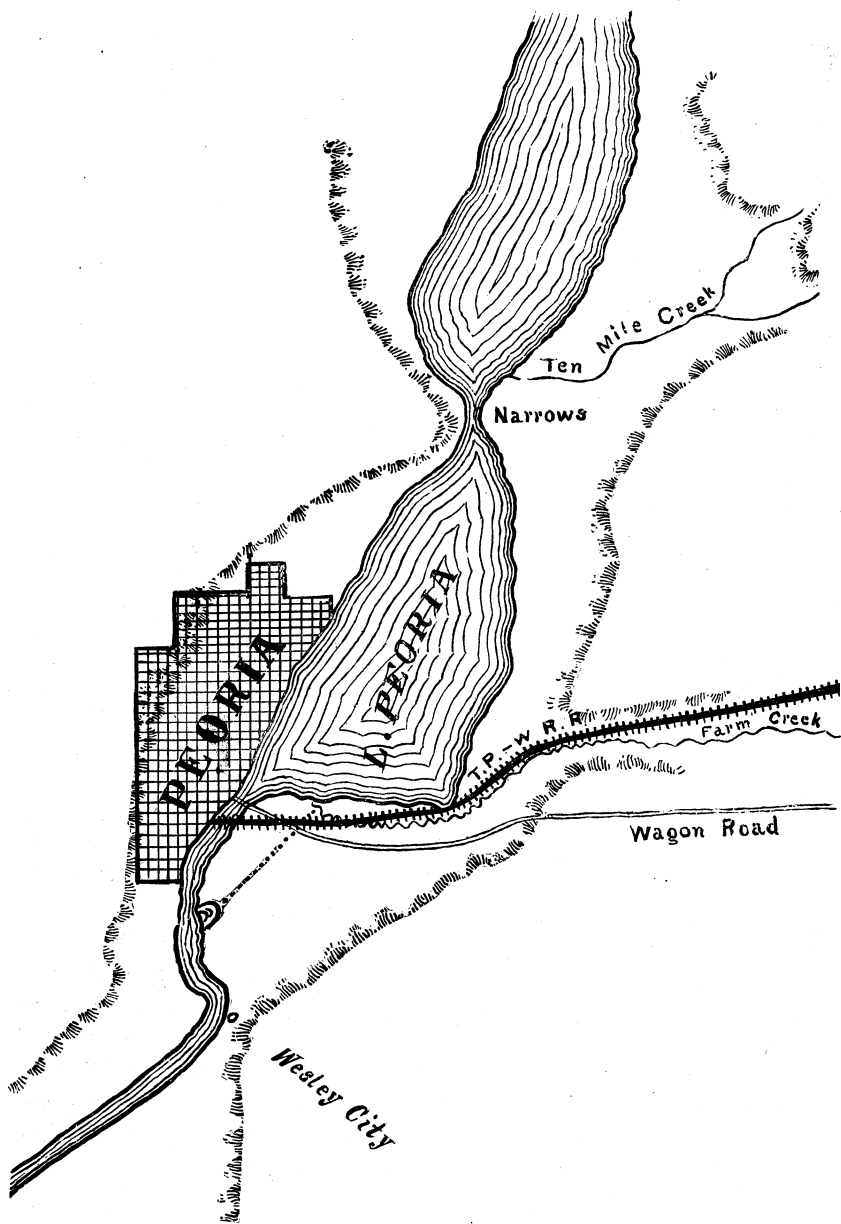
THIRD. By rolling or pushing heavier substances, sand and gravel, along the bottom, until bars or counter-currents prevent a further flow.

While erosion is going on in the upper levels, land is formed in the lower. The denudation being widely extended, is not ordinarily noticeable, and the land formation frequently goes on unobserved for considerable time, being under water, and not until navigation is interfered with, or the made land emerges above water, do we suspect the amount of work which is done by even a small stream.

The stream works all the time, day and night, and whether its waters be clear or muddy it is always doing something to level the hills and fill the ocean bed.

The following pages are a record of the work done by a little stream which falls into Lake Peoria, opposite the city of Peoria. Close observations were made during the years 1876, '77, '78, and occasional records and observations from 1867 to 1876 were obtainable.

Lake Peoria is an expansion of the Illinois River. What is known by the name of Lake Peoria is about fifteen miles long, and in ordinary stages of water about two miles wide. The lake is divided into two portions, the lower portion being four miles long



and separated from the upper lake by the "Narrows," a strait 500 feet wide. This paper deals with the lower lake. Except in high water there is no perceptible current in the lake, but the rapid flow in the constricted and shallow "narrows" and at the outlet shows that a current does exist. Being comparatively quiet, however, facilities are afforded for the deposit of the burden of mud and sand which Farm Creek has until recently been carrying into it.

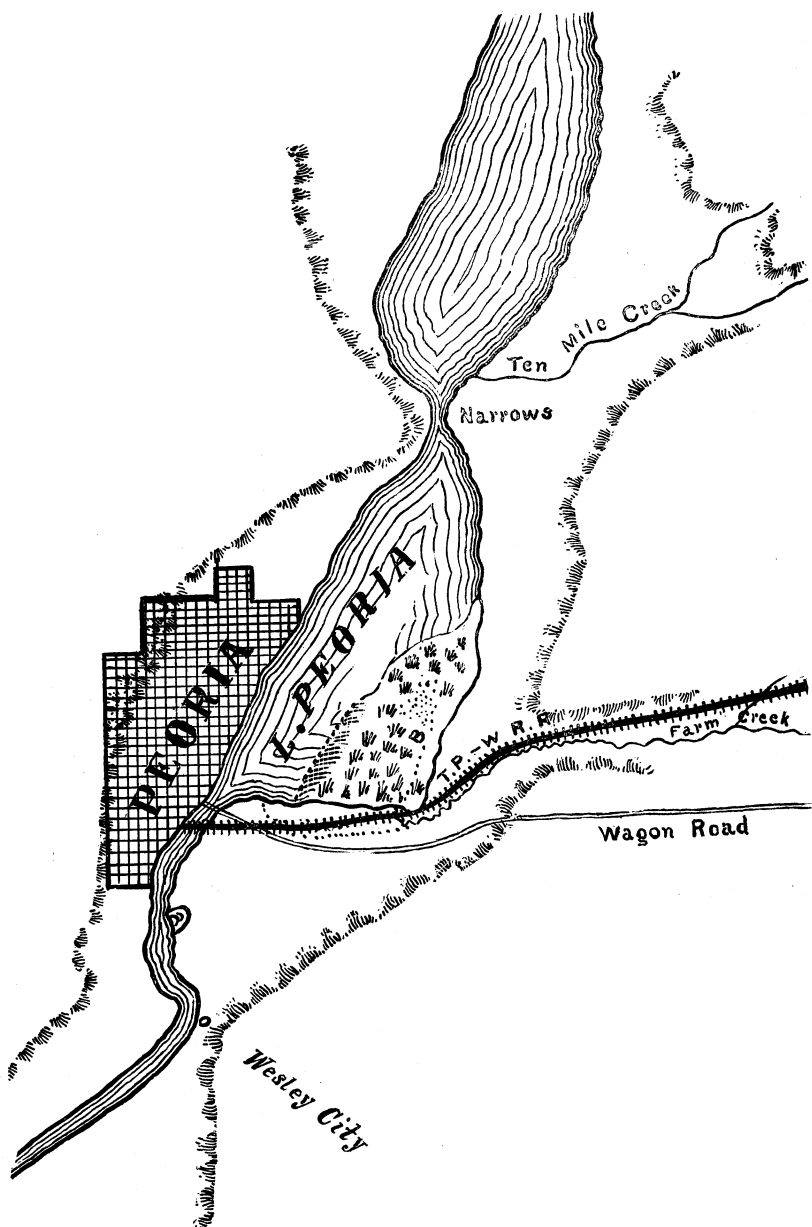
Whatever filling up of the bed of Lake Peoria has been done is the work of Farm Creek. In the high water of spring some silt is, of course, brought down from the upper Illinois, but at least an equal quantity is carried off by the Illinois River below, but generally the upper lake acts as a settling reservoir, and the water which flows through the narrows is comparatively clear. That the upper lake does act as a settling reservoir appears from the fact that no shoaling of the lower lake in its upper portion has been discovered since soundings have been made.

Prior to 1867, Farm Creek ran into the Illinois River through a channel shown by the dotted line in Map No. 1. Its point of *debouchement* into the river varied, but in general it sought the larger stream below the outlet of the lake.

In 1867 the Toledo, Peoria and Wabash Railroad was built. In that year, or afterwards, Farm Creek abandoned its old channel, and turning directly north emptied its waters into the lake.

The lake at that time extended in a line nearly east and west about two miles, and in the channel (500 to 1,000 feet from the Peoria shore) was twelve feet deep at low water. The lake deepened rapidly on the Peoria side, and very gradually on the Tazewell County or east side.

When Farm Creek turned its current directly into Peoria Lake, its waters were brought to rest at once and laid down their burden of sand and soil. A sand-spit formed at the mouth of the creek at the western or down-stream side. This sand-spit (shown in Map No. 2) extended northeast, and year by year grew longer and broader. As it broadened, the mouth of the creek shifted eastward. The creek piled up its sediment on the eastern side of the spit and rapidly filled that portion of the lake. In 1875 a fringe of willows appeared upon the spit, and by 1877 the whole of the newly made land east of the spit was covered with willows and cottonwoods. By this time the creek had crowded itself eastward until it ran close to the original Tazewell shore northward for a mile or more (dotted line B, Map No. 2). All the intervening space between the spit and the



Tazewell shore was now dry land at low water and covered by a dense growth of vegetation, which at high water sifted out whatever detritus was brought down by the creek, and thus raised the surface of the land still more.

In March, 1878, the creek filled its bed (B) and tore a channel for itself through the land it had produced, and running along the original south shore line emptied itself into the lake near the outlet.

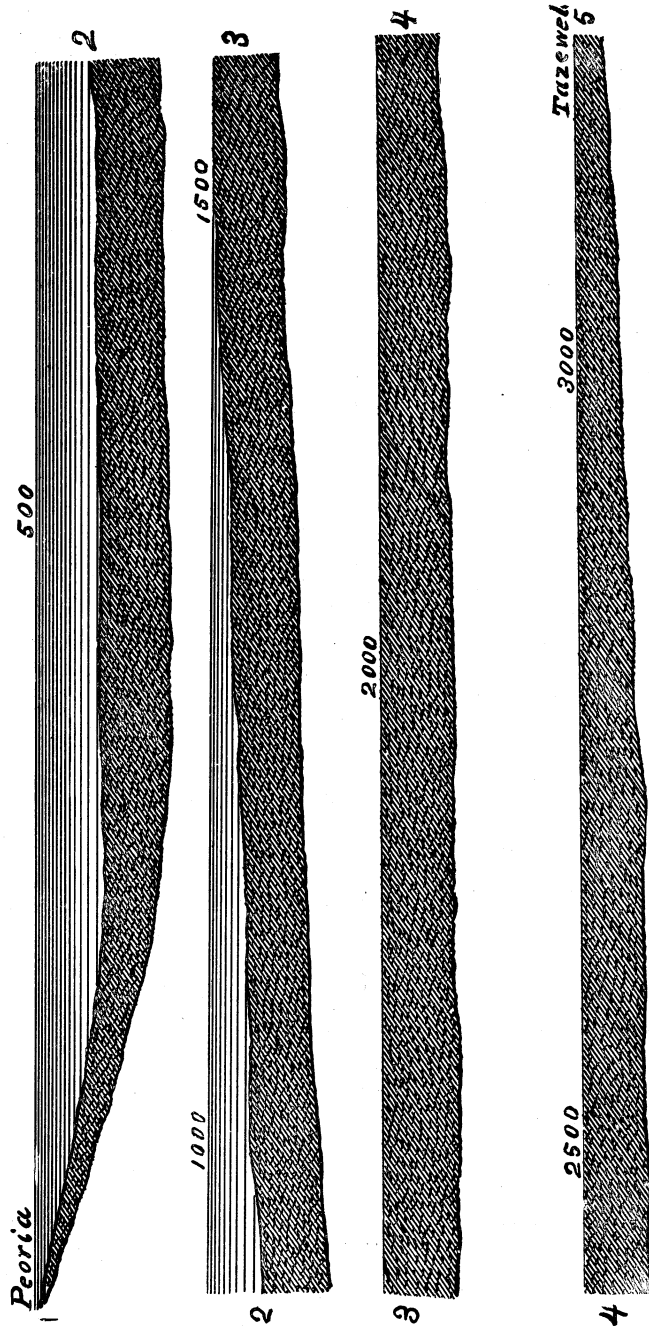
In ten years time it had filled up the whole southeastern corner of the lake, reducing the width thereof at that place from two miles to 1,450 feet, and covering the bottom of one-third of the lake with six feet of mud.

In 1878 the citizens of Peoria had become so alarmed at the threatened destruction of their beautiful lake that they cleared out the original channel of Farm Creek and turned its waters into the Illinois below their city. A large portion of the lake has been hopelessly lost, however, and a miasmatic marsh, flooded in high water, lies over against that pretty town. About 1,000 acres have been taken from the lake and added to Tazewell County.

Besides this, the whole southern portion of the lake has shoaled from thirteen feet to less than six feet in the deepest part, and elsewhere in proportion. Diagram No. 3 shows a cross-section of the lake at 1,750 feet above the outlet. The section starts from the Peoria shore and runs eastward 3,200 feet. The imagination may protract the section. The lower line shows the bottom of the lake in 1867; the light shading shows the bottom in 1877 and the extent of water surface at low water.

Beginning at the wagon bridge at the outlet of the lake, a series of soundings in the deepest water was taken in 1867 by Col. D. C. Jenné. The following table will show the shoaling in 1877:

| | 1867. | 1877. |
|----------------------------|----------|----------|
| 250 feet above bridge..... | 6. feet. | 6. feet. |
| 500 " " "..... | 7. " | 6. " |
| 1,000 " " "..... | 7. " | 5. 9 " |
| 1,500 " " "..... | 7. " | 5.45 " |
| 2,000 " " "..... | 13.3 " | 5. " |
| 2,500 " " "..... | 12. " | 4.45 " |
| 3,000 " " "..... | 12. " | 4. 6 " |
| 3,500 " " "..... | 12.5 " | 5. " |
| 4,000 " " "..... | 12. " | 5.68 " |
| 4,500 " " "..... | 11. " | 6. 5 " |
| 5,000 " " "..... | 13.5 " | 7. " |
| 5,500 " " "..... | 14. " | 7. " |
| 6,000 " " "..... | 11. " | 8. " |
| 6,500 " " "..... | 11. " | 9. " |
| 7,000 " " "..... | 11. " | 9. " |
| 7,500 " " "..... | 11. " | 9. " |
| 10,000 " " "..... | 11. " | 10. " |
| 10,500 " " "..... | 11. " | 11. " |



Soundings above this point show no especial change between 1867 and 1877.

From the above table it appears that the influence of Farm Creek ceased at about two miles up the lake.

A very moderate estimate will give 80,000,000 cubic feet of sediment brought down by this creek in ten years.

Now let us examine the active little stream which has done this work.

Farm Creek is fifty feet wide and three feet deep when full, which is only in freshets. In dry weather it shrinks so as to become almost invisible under its bed. It is difficult, therefore, accurately to determine its discharge, but we may approximate it.

It drains 44 square miles. Upon that country the rainfall averages 42 inches annually. This gives 4,200,000,000 cubic feet of water per annum. The creek cannot, therefore, discharge more than that amount. If we take 75 per cent. of the rainfall as the discharge, which is the usual estimate for the small tributaries of the Mississippi, we will have about 3,000,000,000 cubic feet of water brought down by this stream.

Observation confirms this estimate. When the creek was full it ran 300 feet per minute. When 11 feet wide it was 5 inches deep, and ran 98 feet per minute. When 7 feet wide it was 4 inches deep, and ran 100 feet per minute (having just then shortened its length by a mile).

Averaging all the observations of 1877-8, I find the theoretical estimate of 3,000,000,000 feet of water discharged per annum to be about correct. More than half of this discharge occurred in thirty days.

Thirty billions of cubic feet of water (ten years' flow) have, therefore, moved 80,000,000 cubic feet of sand and mud. The proportion of water to sediment is as 375 to 1.

This is a large proportion of sediment.

| | | | | | |
|------------------------------|-------------|------|---------------------------|-------|-----------|
| The River Po is said to move | | 1 | proportion of sediment to | 300 | of water. |
| " | Ganges | 1 | " | " | " |
| " | Mississippi | 1 | " | " | " |
| | | from | to | 1 | " |
| | | to | 1 | " | " |
| | | | | 1,000 | " |
| | | | | 528 | " |
| | | | | 3,000 | " |

Not all of the sediment moved by Farm Creek was held in suspension. I think that less than three-eighths was properly in suspension. The greater portion was rolled along the bottom. My crude experiments showed a proportion of 1,100 parts of water to one of sediment. This would account for but 30,000,000 of the

80,000,000 of deposit. The remaining 50,000,000 have been pushed or rolled along the bottom.

One day I was witness of this pushing process. I had anchored my boat in the mouth of Farm Creek upon a sand shoal. The water was perfectly clear; nothing was held in suspension. But I observed that the whole bottom seemed alive. Rolling over each other, tumbling this way and that, but always down stream, leaping sometimes six inches at once, the grains of sand were all moving into the lake. This was in dry weather and the water was low — the current not more than 100 feet a minute. I saw then how water, while holding nothing in suspension, can yet effect important movements in the particles of its bed. This pushing process increases in energy, of course, when the stream becomes a torrent in floods, but it is a process which can go on in any flowing stream. Being uninterrupted, the aggregate of its effect must be great. I do not hesitate to express my conviction that five-eighths of the work done by Farm Creek was done by the rolling of sand and mud along the bottom.

Farm Creek presents no unusual conditions. It is an ordinary stream flowing through prairie soil. There are thousands of such streams in the valley of the Mississippi. I apprehend that every one of them does as much in the way of erosion and land formation as Farm Creek, and that many changes which hitherto have been supposed to be the work of vast cycles of time have been the work of but a few years.

The above observations may be of service in solving the historic problem of La Salle's fort Crève Cœur.

On the 1st of January, 1680, La Salle landed at an Indian village on Peoria Lake. Shortly afterward he began the erection of a palisaded fort "on the left bank of the lake at its lower extremity."

The record both of himself and Father Hennepin, the priest who accompanied the explorers, are definite in giving the location as on the "left bank" and at the southern part of the lake. It is also stated that the fort was on a hill and commanded the approach by water up and down. This fort was named Crève Cœur, from the misfortunes which befel the heroic chevalier.

Historians have been at a loss to determine the site of this fort. By examining the accompanying maps it will be seen that there is no high ground anywhere along the southern shore of Lake Peoria. On the east, west and south the bluffs are a mile or more from the shore of the lake. At the northwest corner, overlooking the narrows, the bluffs do touch the lake, and a hill rises abruptly 100 feet

and more. Some have supposed that this must have been the site of Crève Cœur, and that the explorers must have meant the southern extremity of the upper lake. But unfortunately this point is on the *right* side of the stream and not on the *left*. Nothing can justify the supposition that La Salle, who had traversed the Illinois River from its source, did not know which way the water flowed. We must look on the opposite bank for the site of Crève Cœur.

One place answers the greater part of the conditions. It is a point two miles down the river at Wesley City. Here the bluff touches the river; an uninterrupted view is had up and down stream; it is on the *left* bank, and several hills suitable for defensive works against indians still exist. This position answers so well to the description given by La Salle that most historians have settled upon it as the site of Crève Cœur. But it is not on the lake; it is more than two miles south. The country between it and the lake is heavily wooded. Part of the land is low, but several hundred acres are in good farms. Various conjectures have been ventured to reconcile this location at Wesley with La Salle's statement that his fort was on the lake, such as that "two miles was so short a distance that La Salle would not mention it," or that "the river happened to be very high so that the limits of the lake were not well defined." But these conjectures are not satisfactory.

The true explanation appears to me to be that in La Salle's day Lake Peoria extended as far south as Wesley City. The whole intervening land, two and a half miles long by one mile broad, has been made by Farm Creek in the two hundred years since the French occupation.